

PATENT

N1085-90163
[TSMC2002-1031]

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of: Wen-Song Tseng, et al.

Serial No.: 10/761,002

Group Art Unit: 1634

Filed: January 20, 2004

Examiner: F. Toledo

For: **WET BENCH WAFER FLOATING DETECTION SYSTEM**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CERTIFICATE UNDER 37 CFR 1.8(a)
I HEREBY CERTIFY THAT THIS
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VA 22313-1450.

Richard A. Paikoff
Richard A. Paikoff, Reg. No. 34,892

3/27/06

Sir:

DECLARATION OF WENG-SONG TSENG AND KUO-LIANG LU UNDER 37 CFR 1.131

1. We, Wen-Song Tseng and Kuo-Liang Lu (collectively, "We") are currently employees of Taiwan Semiconductor Manufacturing Co., Ltd. ("TSMC"), the assignee of the present application.

2. We are joint inventors of the subject matter disclosed in U.S. Patent Application Serial No. 10/761,002, filed January 20, 2004, entitled "Wet Bench Wafer Floating Detection System" (the "Application").

3. We submit this Declaration to the United State Patent Office under 37 C.F.R. 1.131 to swear behind U.S. Published Application No. 2004/0035449A1 to Nam, which has a United States effective filing date of July 17, 2003 and which is relied on by the Examiner in the Official Action dated December 28, 2005 in rejecting the pending claims.

4. All of the events outlined below occurred in Taiwan, R.O.C. and after Taiwan, R.O.C. became a WTO country in January 2002.

5. Before July 17, 2003, we conceived of a new method and system for preventing wafer breakage during wet processing as described in the Application.

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6. Prior to July 17, 2003, we reduced to practice our method for preventing wafer breakage in a wet processing tank, comprising: providing a wet processing tank, wherein said wafer is to be placed within said wet processing tank; providing a sensor within said wet processing tank, wherein said sensor continuously counts bubbles formed within said wet processing tank in a time interval; and querying said sensor, wherein if a bubble count within said time interval exceeds a trigger point, an alarm is given and said wafer is not placed into said wet processing tank.

7. Prior to July 17, 2003, we reduced to practice our method for preventing wafer breakage in a wet processing tank, comprising: providing a wet processing tank comprising a protection tank, within which is provided an inner tank and an outer tank surrounding said inner tank, wherein a plurality of wafers are to be placed within said inner tank; providing a chemical circulation loop, comprising a chemical liquid circulating out of said outer tank, through a pump, and into said inner tank; providing a sensor within said chemical circulation loop, wherein said chemical liquid travels through said sensor prior to traveling through said pump, wherein said sensor continuously counts bubbles formed within said inner tank in a time interval; and querying said sensor, wherein if a bubble count within said time interval exceeds a trigger point, an alarm is given and said plurality of wafers are not placed into said inner tank.

8. Prior to July 17, 2003, we understand that TSMC forwarded an invention disclosure record to our patent counsel, for preparation of the Application. The invention disclosure record included a PowerPoint® presentation (the "Presentation") documenting our invention and describing related aspects in reducing the invention to practice. The Presentation is attached as Exhibit A.

9. The abbreviations in Exhibit A are as follows: "SN" – silicon nitride; "DIW" – deionized water; "E/R" – etch rate; "AVDR2" – air valve bypass loop; "AVDR3" – air valve drain filter; "AVSP1" – air valve which serves as a sampling port; "AP1" – circulation pump; "AVCH1, AVCH3" – air valves.

10. As can be seen in Exhibit A, we tested our method and system for preventing wafer breakage during wet processing, in which a wet processing tank is provided wherein a wafer is to be placed within the wet processing tank; a sensor is provided within the wet

processing tank wherein the sensor continuously counts bubbles formed within the wet processing tank in a time interval; the sensor is queried wherein if a bubble count within the time interval exceeds a trigger point, then an alarm is given so that a process lot will not be entered into the wet processing tank.

11. We hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Title 18, United States Code, Section 1001, and that such willful false statements may jeopardize the validity of the above-identified application or any patent issuing thereon.

DATE: 3/9/2006

Wen-Song Tseng

Wen-Song Tseng

DATE: 03/09/2006

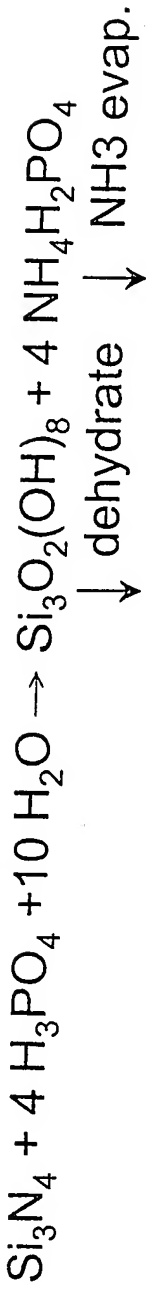
Kuo-Liang Lu

Kuo-Liang Lu

WSN WAFER BROKEN PREVENTION

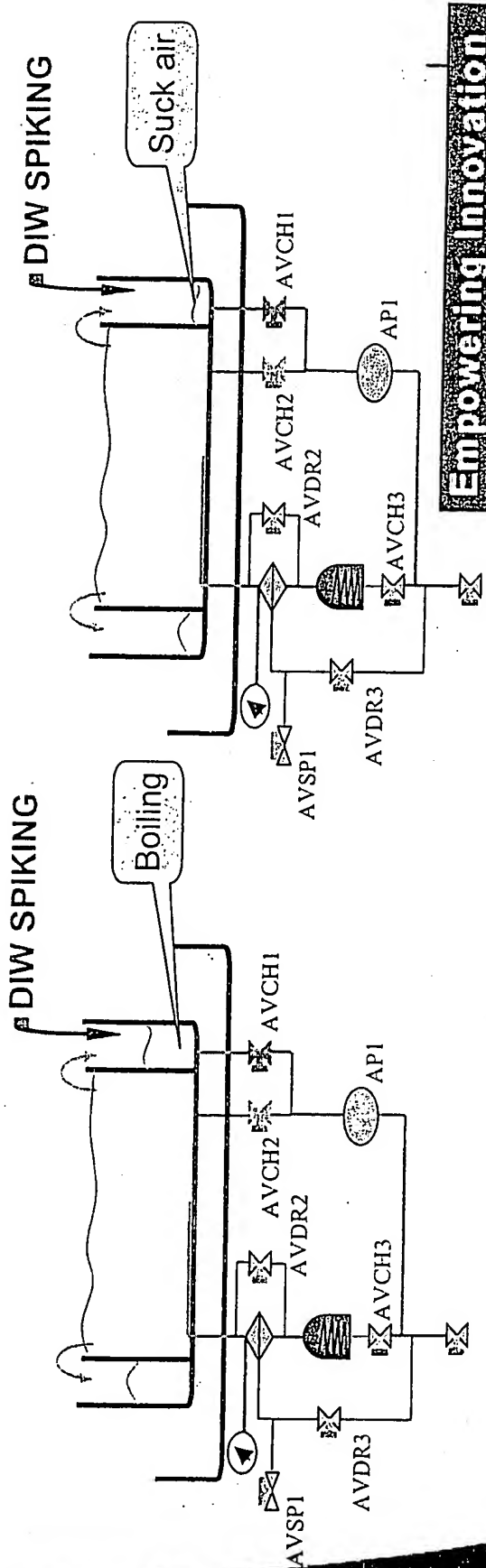
■ SN remove

- Etch reaction (160°C)



OX precipitate H_3PO_4

- H₂O refilled affect E/R, boiling of H₃PO₄, amount of dehydrated phosphoric acid.
- Boiling too much and suck air into circulation loop will cause wafer floating or broken in the tank.



WSN WAFER BROKEN PREVENTION

■ Wafer broken prevention

- ☐ Add bubble detect sensor
- ☐ Calculate the bubble counts in period of 10 sec.
If over 30 ea / 10 sec, it may cause wafer broken
- ☐ Check sensor "OFF" signal, if more than 2 sec,
it may suck air into circulation loop

